

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0009] with the following paragraph.

In copending ~~U.S. Application No. 09/138,994, filed Aug. 24, 1998~~ U.S. Patent No. 6,507,586, of common assignee herewith, and hereby incorporated by reference, a technique of IP multicasting over existing broadband networks without using a return link is disclosed. This technique allows the issues of multicast group membership and error detection and recovery to be handled locally within an end-user terminal, without need for returning data to a host. According to the technique a single data transmitter sends a group of data items to a subset of possible receivers over a one-way channel. Each data item is divided into blocks which are encapsulated to form datagrams, each including a block sequence number, a data item identifier, and a timestamp indicating the age of the data item. A group directory is regularly sent by the transmitter to each of the possible receivers. The group directory contains information for all groups of data items, enabling each receiver to select the group of data item it wishes to receive. Reliability is provided by periodic retransmission of missing data. Despite these advantages, significant problems remain.

Please replace paragraph [0039] with the following paragraph.

The cache 14 employs the REMADE protocol to multicast the content. The REMADE protocol is disclosed in the above noted ~~U.S. Application No. 09/138,994~~ U.S. Patent No. 6,507,586. The REMADE protocol is a technique of IP multicasting over existing broadband networks without using a return link. This technique allows the issues of multicast group membership and error detection and recovery to be handled locally within an end-user terminal, without need for returning data to a host. According to the technique, a single data transmitter sends a group of data items to a subset of possible receivers. Each data item is divided into blocks, which are encapsulated to form datagrams, each including a block sequence number, a data item identifier, and a timestamp indicating the age of the data item. A catalog, comprising a group directory is regularly sent by the transmitter to each of the possible receivers. The group directory contains information for all groups of data items, enabling each receiver to select the group of data item it wishes to receive. Reliability may be provided by periodic retransmission of missing data.

Please replace paragraph [0041] with the following paragraph.

Referring now to Fig. 2, a representative group directory, directory system 30, is shown. The directory system 30 is a preferably a hierarchical arrangement, and comprises a root directory 32, with links to subdirectories 34. The root directory 32, and any of the subdirectories 34 may have links to general data items 36, or to patches 38. The arrangement is recursive, with subdirectories 34 having links to more deeply nested subdirectories, such as subdirectory 40. The directory system 30 may contain the following multicast group information: the group's multicast address; the group's assigned port; the range of data items in the group; the group's timestamp; and information (such as keywords) related to the group contents. Multicast receivers can check the directory regularly and use the information in it to select "interesting groups". Decisions as to whether to join or leave a group are made entirely within the receivers, i.e. the multicast transmitter is ignorant of group membership.

Please replace paragraph [0045] with the following paragraph.

Typically, the end-user clients 28 have both transmitting and receiving capability. When the subsidiary caches 26 have organized their data inventory into a tree-structured catalog according to the REMADE protocol, as disclosed more fully in the above noted ~~Application No. 09/138,994~~ U.S. Patent No. 6,507,586, they transmit it to all the end-user clients 28, or to a predefined multicast group of the end-user clients 28. The end-user clients 28 receive a relevant part of the catalog, or may receive the whole catalog. They choose a document, and begin receiving it according to the REMADE protocol. Of course, various members end-user clients 28 may choose different documents, in which case all the documents are transmitted according to the governing policy. Clients not currently members of the multicast group may in some circumstances elect to join it. Based on considerations such as the average number of requests for particular content specified in the catalog, the subsidiary caches 26 can independently decide to elect a periodic mode of transmission of the catalog or the content, or to transmit either or both of them on demand. In like manner, the cache 24 can elect a mode of transmission of its catalog to the subsidiary caches 26.